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METHODS, COMPOSITIONS AND DEVICES  
FOR GROWING HEMATOPOIETICS CELLS

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ABSTRACT OF THE DISCLOSURE

Methods, compositions and devices are provided  
for the growth of hematopoietic cells in culture.  
Bioreactors are provided in which diverse cell types are  
10 simultaneously cultured in the presence of appropriate  
levels of nutrients and growth factors substantially  
continuously maintained in the bioreactor while removing  
undesirable metabolic products. This simultaneous  
culture of multiple cell types is required for the  
15 successful reconstruction of hematopoietic tissue ex  
vivo. At least one growth factor is provided through  
excretion by transfected stromal cells, particularly  
heterologous cells. Means are provided for maintaining  
the stromal cells and hematopoietic cells separately, to  
20 allow for early removal of the hematopoietic cells.